Problem Statement

For the embedded electronics of an automotive system consisting of ECUs and software components, it is required to identify and develop safe and reliable software integration and deployment architectures, where these architectures map software components to available ECUs and govern/coordinate their interaction and interoperation. The developed software integration and deployment architectures must also optimize certain QoS parameters (such as safety, dependability, fault-tolerance, timeliness, etc.) and limited hardware resources available (such as memory).

Motivation

The complexity and sophistication of modern automotive systems is steadily increasing in terms of the electronics and embedded software deployed. Today's automotive systems may contain up to a hundred sensors and Electronic Control Units (ECUs). Furthermore, software is assuming a dominant proportion in the costs of the vehicles. For the next ten years an increase of 10-15% of software in the share of costs of a vehicle is forecasted every year.

The use of software component technology to control/operate these sensors and ECUs is cost-effective and offers innovative and flexible design solutions. Nevertheless, the integration of software components and their deployment on their target hosts (sensors and ECUs) that satisfies both functional and qualitative (QoS) requirements in safety-critical and real-time systems is a non-trivial task. Such an integration and deployment process is complex and requires automated tools and techniques.

Equally important are the characteristics of interconnections or communication medium among both the hardware and software components. These characteristics also have significant effects on the automotive system's QoS.